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## MARINE MOLLUSKS OF HAWAII—XIV, XV.

BY HENRY A. PILSBRY.

Part of the Hawaiian tectibranch mollusks were considered in part II of this series.<sup>1</sup> Others were found in the Bryan and Thaanum collections, and in material taken in 1913. Probably further additions can be made when material collected this year is assorted; but as the following revision has already been held some time awaiting the preparation of illustrations, it is thought best to publish at this time.

Very little is known of the ecology of Hawaiian Tectibranchs. Collectors of living specimens should note their stations and such conditions as can be observed.

Little additional information has come to hand on the Aplysioid and Notaspidian Tectibranchs since the publication of Manual of Conchology, Vol. XVI, in which the known species are described.

*Key to Hawaiian genera of cephalaspidian Tectibranchs.*

1. Shell an open, flat spiral, wholly concealed, the mantle concrecent over it ..... *Aglaia* Ren.  
Shell not covered by the mantle..... 2
2. Spire exposed..... 3  
Spire deeply sunken or concealed..... 6
3. Spire more or less conic, the apex not depressed..... 4  
Spire convex or level, apex not projecting above the following whorl..... *Hydatinidæ*.
4. Larger shells, with a strong columellar fold or a basal truncation; spiral grooves punctured when present..... 5  
Smaller, white shells with a weak columellar fold and without punctured spiral grooves; apical whorl tilted on edge.  
*Acteocina* Gray.
5. Columella having a strong, bilobed fold above, concave below; imperforate..... *Pupa* Bolt.  
Columella straight, with a small fold above and obliquely truncate at base; shell oval, with close spiral sculpture; perforate.  
*Bullina* Fér.

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<sup>1</sup> Proc. A. N. S. Phila., 1917, p. 214.

6. Summit narrowly, deeply umbilicate..... 7  
 Summit imperforate or barely perforate..... 8
7. Shell larger, in large part smooth, marbled with brown.  
*Bullaria* Raf.  
 Shell small, spirally sculptured throughout, often banded.  
*Mnestia* Ads.
8. Axial margin above the summit folded..... *Atys* Helbl.  
 Axial margin not folded above..... 9
9. Columella abruptly truncate anteriorly..... *Dinia* Ads.  
 Columella slightly concave, indistinctly truncate anteriorly;  
 shell having incised spiral lines throughout.  
*Haminæa*, subg. *Liloea*.
- Columella broadly, strongly concave, not truncate..... 10
10. A thin, broad, spiral plate posteriorly on columella; shell green,  
 shaped like a split bean..... *Smaragdinella* Ad.  
 No such columellar plate; light colored..... 11
11. Summit produced in a narrow spout; shell very fragile, showing  
 the interior in a basal view..... *Volvatella* Pse.  
 Summit not produced..... 12
12. Summit rather narrow, not impressed over the axis; aperture  
 very ample below..... *Scaphander* Montf.  
 Summit rounded, impressed in the center. *Haminæa* T. & K.

#### ACTEONIDÆ.

Three species of the genus *Pupa* Bolt. (*Solidula* F. deW.) have been found. *P. nitidula* (Lam.), a widely dispersed species, is known from the Islands by specimens in the collection of the Academy from Dr. Newcomb. It has not been found by any recent collector, so far as I know. It seems possible that Newcomb's shells were from Polynesia. In his time many shells from the southern islands were coming into Honolulu in the missionary schooner *Morning Star*, and sold there for the benefit of missions.

1. Nearly white; smooth save for a group of spiral grooves at the base; spire very short, apex mamillar; columellar fold very heavy and prominent. Length 17, diameter 9 to 10 mm.  
*P. nitidula* (Lam.)  
 Spirally grooved at summit and below middle of last whorl, or throughout; spire conic..... 2
2. Deeply grooved spirally throughout; 9 x 4 to 11.5 x 5.1 mm.  
*P. thaanumi* Pils.

Grooves narrower, less deep; obsolete or weaker and more widely spaced above the middle of last whorl; 13 to 14 mm. long. Fossil, around Pearl Harbor.....*P. pearlensis*, n. sp.

**Pupa *thaanumi* Pils.**

Further specimens of this species confirm the characters of color and sculpture, but show that it sometimes reaches a larger size; and some specimens are broader with relatively shorter spire. Two from Haena, Kanai, measure:

Length 11.5, diameter 5.1 mm.

Length 10, diameter 4.7 mm.

Kauai: Haena. Oahu: Honolulu; Mokapu Point.

**Pupa *pearlensis* n. sp. Figure 1.**

The shell is similar in shape to *P. thaanumi*. It differs by the larger size, the narrower, less deeply cut spiral grooves; above the middle of the last whorl several grooves are lacking in typical specimens; when present they are weaker and more widely spaced than in *thaanumi*. No color is visible in the fossil specimens.

Length 13.7, diameter 7.2 mm. Type. Near Waipahu.

Length 14, diameter 6.8 mm. Near Aiea Station.

Length 11.5, diameter 6 mm. Near Aiea Station. Young.

Oahu: fossil in superficial deposits along the Oahu Railway in the neighborhood of Pearl Harbor. The type lot is from the bank of a taro patch on the west side of the railroad about half a mile west of Waipahu Station. Also found east of Aiea Station, 6-10 feet above level of the Eastern Loch (Pilsbry), and at Hoaeae (W. A. Bryan).

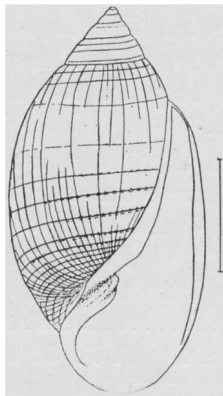


Fig. 1.—*Pupa pearlensis*, n. sp.

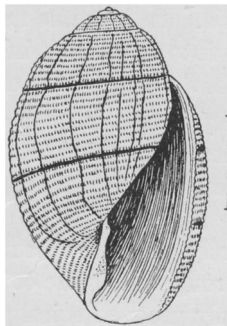


Fig. 2.—*Bullina scabra solida*, n. subsp

***Bullina scabra solida* n. subsp. Figure 2.**

Differing from *B. scabra* by its solidity, the lip being far thicker. The fold near the upper end of the straight columella is much stronger. It agrees with *B. scabra* in the sculpture of close, punctate, spiral furrows, and in the color, two red lines dividing three zones which have thin, waved axial red lines.

Length 12.3, diameter 7.7 mm.

Oahu: Honolulu, type locality; Kauai: Haena (Wm. A. Bryan).

The ordinary thin form of *B. scabra* I have not seen from the Islands. Even the young shells of the Hawaiian race are thick.

***Bullina vitrea* Pease.**

*Bullina vitrea* Pse., P. Z. J. 1860, p. 19; repeated in Man. Conch. XV, p. 177. Sowerby, Conch. Icon. XVIII, pl. 1, fig. 4.

Described as thin, fragile, with or without one or two gray bands composed of two or three black lines, and with no axial lines. Otherwise appears rather similar to *B. scabra*. Not yet found by modern collectors.

**ACTEOCINIDAE (Tornatinidae).<sup>2</sup>*****Acteocina sandwicensis* (Pse.)**

Honolulu, Oahu; Haena, Kauai.

***Acteocina honoluluensis* Pils.**

Honolulu and Haleiwa, Oahu; Lisiansky I.

***Acteocina hawaiiensis* Pils.**

Off Maui, near Lahaina.

**BULLARIIDAE.*****Bullaria peaseana* (Pils.)**

*Bulla peaseana* Pils., Man. Conch. XV, p. 348.

This mottled species, very similar to the West Indian *B. occidentalis*, is generally spread in the islands. Specimens are before me from Oahu: Haleiwa, Kaneohe Bay, Kailua. Maui: Light-house Point, Lahaina. Hawaii: Hilo.

**SCAPHANDRIDÆ.**

*Scaphander* (*Bucconia*) *alatus* Dall, and *Scaphander* (*Sabatia*) *pustulosus* Dall, are from deep water, 234 to 298 fathoms, near the Hawaiian Islands.

***Smaragdinella viridis* (Q. & G.)**

Oval, thin, green, with a thin, broad plate on the columella. Koko Head, Oahu, collected by Wm. A. Bryan; taken also by earlier collectors in the Islands, but not definitely localized.

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<sup>2</sup>For descriptions and figures of the three species enumerated, see Proc. A. N. S. Phila., 1917, pp. 215, 216; 1920, p. 300.

***Dinia compitorum*** n. sp. Figure 3.

The shell is white, oblong, perforate, rounded below, truncate and imperforate at the summit. The surface has faint traces of spiral striae, and at the base there are several distinct spirals. The lip is inserted in the center above, rising but little; outer lip is quite

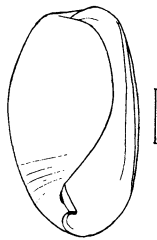


Fig. 3.—*Dinia compitorum* n. sp.

slightly curved, and in adults is rather strongly thickened within. In profile view it recedes decidedly above, very little at the base, and curves forward very slightly elsewhere. The columella projects obliquely towards the right and is abruptly truncate at base.

Length 7.1, diameter 4 mm.

Oahu: Honolulu, type locality and Haleiwa (Pilsbry, 1913); Paumalu and Mokapu Point (Bryan). Maui: off Mala Bay, near Lahaina in 25 to 75 feet. (Thaanum and Langford).

*Dinia* has been considered a subgenus of *Atys* but it differs by lacking a spiral fold in the lip ascending from the summit, and by the very strong truncation of the columella, characters sufficient for generic separation. There are now four Indo-Pacific species.

#### ATYS.

Five of the six species of *Atys* now known from the Islands were figured in the first paper of this series, 1917, pp. 216–218. A fossil (Pleistocene?) species, probably extinct, is now added.

#### *Key to the Hawaiian species of Atys.*

1. Columella rather thin, mainly vertical or weakly sigmoid, the edge but narrowly reflected (*Atys* proper).....2
- Columella thicker, its edge reflected, bounded by an arcuate groove (Subgenus *Aliculastrum* Pils.).....3
2. Diameter about two-thirds of the length; rather inflated, often striped; 15.5 x 10 mm.....*A. kuhnsi* Pils.
- Smaller, less inflated, white.....*A. semistriata* Pse.

3. Apical part of the lip biangulate at summit; diameter slightly less than half the length.....4  
Lip not biangulate at summit; diameter about half the length;  
19 x 9.5 mm.....*A. kekele* n. sp.
4. Shell conspicuously widest below the middle...*A. debilis* Pse.  
Shell widest about the middle.....5
5. Surface axially weakly plicate; 5 x 2.3 mm....*A. costulosa* Pse.  
Without noticeable axial sculpture; 10.6 x 4.8 mm.  
*A. cornuta* Pils.

***Atys semistriata* Pease.**

Proc. A. N. S. Phila., 1917, p. 217, fig. 5.

The specimen in the Pease collection which I figured is larger than any others seen, few of which exceed 10 mm. in length. Typically it is distinctly wider below the middle, but sometimes the greatest diameter is nearly median. There is also variation in the number of engraved lines on the lower third, which are often less numerous, perhaps always so in the immature shells. Specimens seen are from Kauai: Hanalei River and Haena. Oahu: Waikiki beach, Kahala and Waimanalu. Maui: Kahului dunes (Bryan). Kahoolawe (Pilsbry).

***Atys semistriata mua* n. subsp.**

The shell is decidedly compressed near the summit which is narrower than in the typical form.

Honolulu (Pilsbry, 1913). 116611 A. N. S. P.

***Atys semistriata fordinsulae* n. subsp.**

Greatest diameter about median; about 10 spiral grooves above and below. Length 10.5, diameter 6.3 mm. Ford's Island, in Pearl Harbor (W. A. Bryan).

***Atys kekele* n. sp. Figure 4.**

The shell is oblong, widest below the middle, tapering slowly posteriorly to the rather narrow, angular vertex; outline towards the base rather strongly convex. Near the summit there are 8 or 9 spiral grooves, the lower ones widely spaced. The convex base has numerous finer and closer linear grooves. Vertex rather deeply excavated. The aperture is very narrow in the upper half, moderately dilated below. There is a strongly salient, compressed fold in the sloping upper margin of the lip. Columella rather thick, nearly straight, joining the basal margin in a short curve. Basal margin retreating.

Length 19, diameter 9.5 mm.

Length 17, diameter 8.5 mm.

Oahu: on a taro patch embankment west of the Oahu railroad, about a half mile west of Waipahu station, Pilsbry, 1913... Type 116610 A. N. S. P.

Only found fossil in earth dug out of the taro field probably Pleistocene. It is related to *A. cylindrica* (Helbl.), but in the present species the upper part of the aperture is narrower, the excavation of the summit deeper with angular margin; the base is more effuse, and the columellar callus is more raised, the groove bounding it being wider.

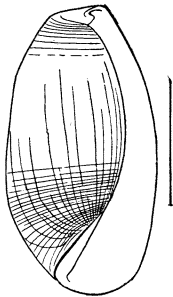


Fig. 4.—*Atys kekele*, n. sp.

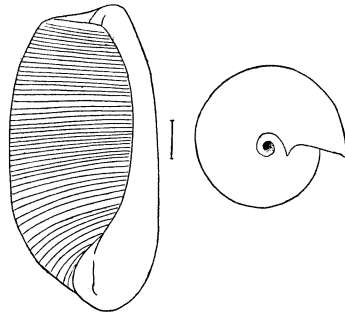


Fig. 5.—*Mnestia pusilla* (Pse.)

***Mnestia pusilla*** (Pease). Figure 5.

*Haminea pusilla* Pse., P. Z. S. 1860, p. 20; description repeated in Man. Conch. XV, p. 364.

This species was described by Pease in his earlier manner, Linnean in brevity. It is not present in his collection in the M. C. Z., but his allusions to its small size, solidity, cancellated surface and umbilicate apex apply well to a small shell which has been taken in several localities.

The shell is solid, nearly cylindric in the middle, contracting rather abruptly towards the ends. It is whitish with an ill-defined white band near the base, some indistinct brownish markings above it. The surface has strongly impressed spiral lines throughout, the intervals cut by much finer, shallower, close axial impressed lines, hardly visible except under the microscope. The aperture is very narrow in the upper two-thirds, but dilated somewhat below. The outer lip rises well above the vertex, which is narrowly, deeply umbilicate; outer margin rather straightened. Columella nearly straight and having a very slight fold.



Length 5, diameter 2.4 mm., largest specimen.

Oahu: Honolulu, Mokapu Point and Paumalu (W. A. Bryan); Haleiwa (Pilsbry). Maui: off Kaanapali in 60 feet. (Thaanum and Langford).

This species is smaller than *Mnestia bizona* (A. Adams), and does not have the distinct bands of the typical form of that species; but the relationship appears to be very intimate.

The shore specimens are bleached quite white.

*Mnestia* has been generally considered a subgenus of *Cylichna*. Many authors consider the latter name to be a homonym of *Cylichnus* (Insecta), and moreover, *Mnestia* differs from *Cylichna* by its well developed spiral sculpture; its soft parts are unknown. For the present it appears best to treat the two groups as generically distinct.

#### AKERIDÆ.

#### HAMINÆA.

*Haminæa*<sup>3</sup> appears divisible into three sections by the structure of the columella. These are defined in the following.

#### *Key to Hawaiian species of Haminæa.*

1. Columella deeply concave, the reflected columellar margin crescentic, rather thick, its edge separated from the whorl by a furrow. Section *Haloa*, new section, type *H. crocata* Pse. . . . . 2
- Columella but slightly concave, the columellar edge free, narrow, and but little reflected, an umbilical crevice behind it. Shell narrow (diameter less than half the length in our species); sculptured with engraved spiral lines throughout. Subgenus *Liloea*, new subg., type *H. tomaculum* Pils. . . . . 4
- Columella concave, its reflected margin rather broad, thin, at the edge closely appressed to the whorl. Section *Haminæa* proper, type *Bulla hydatis*; not known to be represented in the Hawaiian fauna.
2. Apex perforate. . . . . *H. sandwichensis* Sowb.
- Apex imperforate. . . . . 3
3. Oval; diameter two-thirds the length or less; yellowish when fresh; less than 14 mm. long. . . . . *H. crocata* Pse.
- . . . . . *H. galba* Pse.

<sup>3</sup> Iredale has shown that the earliest spelling of "*Haminea*" was *Haminæa*. Proc. Malac. Soc. Lond. XI, p. 172.

More globose; white; 14 to 17 mm. long. *H. aperta oahuensis* Pils.

4. Diameter equalling or close to half the length. . . . . *H. curta* (A. Ad.)  
Diameter less than half the length. . . . . 5
5. Nearly cylindric, elongate. . . . . *H. tomaculum* Pils.  
Shorter; sides distinctly convex. . . . . *H. olopana*, n. sp.

**Haminea crocata** Pease. Figure 6.

Oval, light ochraceous buff. The specimen figured, received from Pease, measures, length 13.2, diameter, 8.3 mm., but most of those seen are smaller. *H. crocata* is scarcely to be distinguished from *H. galba* Pse.; the latter (fig. 7, length 11, diameter 6.8 mm.) is perceptibly less swollen, with the lip rising less at the summit; according to Pease there are differences in the shape and color of

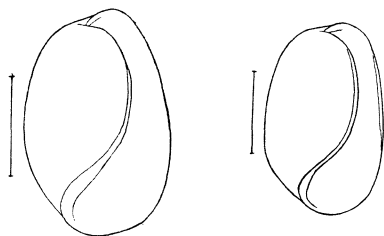


Fig. 6.—*H. crocata* Pse. Fig. 7.—*H. galba* Pse.

the living animals. In actual practice I find the assorting of specimens far from easy. The historic examples figured are extremes and recently collected shells often fall short of the ideal form. Both forms have a close, fine, shallow and wavy spiral striation, scarcely visible except under the microscope.

Probably when the living animals are observed the conclusions of Pease can be tested, and the matter put on a sounder basis.

*H. crocata* is before me from Paumalu, Kailua, Koko Head and Kaneohe Bay, Oahu, and Haena, Kauai. Specimens referable to *H. galba* from Paumalu, Honolulu, Kaneohe Bay, Oahu, and Haena, Kauai.

**Haminea sandwichensis** Sowerby.

This shell is said to have an umbilicated summit and more pointed ends. It is white, and rather similar to the preceding in shape. I have not seen it in some hundreds of Hawaiian *Hamineas* examined.

***Haminea aperta oahuensis* Pils.**

Oahu: 1½ miles east of Kahuku, Pilsbry. Additional specimens from Oahu are somewhat larger, up to 17 mm. long. They are strongly malleate or faceted around the middle.

In the section *Haloa*, containing the foregoing species, the columella resembles that of *Bullaria* or *Aliculastrum*.

***Haminea curta* (A. Ad.) Figure 8a.**

*Bulla curta* A. Adams, Thesaurus Conchyliorum II, p. 582, pl. 124, fig. 100. Pilsbry, Man. Conch. XV, p. 368.

This species was described without locality. Specimens from Fiji collected by Andrew Garrett agree with the original figure. I refer to this species provisionally two smaller, perhaps immature, examples from Kaneohe Bay, Oahu, one of them figured. It measures, length 7, diameter 3.5 mm. The straighter lateral outlines separate this from *H. olopana*. It has the same sculpture as *H. olopana*, fine, clearly engraved spiral lines of which I count about 36.

*H. curta* was first reported from the Sandwich Islands by von Martens.<sup>4</sup> Cooke united as synonyms certain Red Sea forms, whether correctly or not remains to be seen.

The original figure of *H. curta* measures, length 14.3, diameter 7.5 mm. One from Fiji measures, 12.3, diameter 6.3 mm. The summit is very minutely perforate, and the lateral outlines are a trifle straighter than in the Kaneohe Bay form figured.

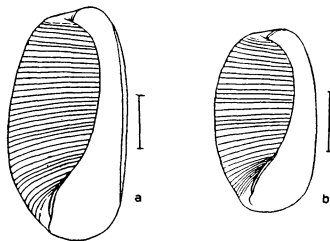


Fig. 8.—a, *Haminea curta* A. Ad. b, *H. olopana* n. sp.

***Haminea olopana* n. sp. Figure 8b.**

The shell approaches a cylindric form, but the outlines are noticeably convex. It is thin, translucent whitish with opaque white terminations. Surface scored by fine spiral lines of which I count 26 just behind the outer lip. There are additional closer ones in

<sup>4</sup> Donum Bismarekianum, p. 53.

the columellar-basal region. These impressed lines are very smoothly evenly engraved, widely spaced, and appear white on the translucent ground. The rounded vertex is minutely perforate. There is a fine slit behind the columellar callus. The aperture dilates below. Outer lip arches forward; basal lip receding. The columella is only weakly concave with a narrow, expanded edge, forming a long umbilical crevice; below it is slightly truncate.

Length 7.8, diameter 3.3 mm.

Kauai: Haena (W. A. Bryan).

A less cylindric species than *H. curta*.

***Haminea tomaculum* Pils.**

*Haminea curta tomaculum* Pils., Proc. A. N. S. Phila., 1917, p. 219, fig. 10.

Further study of the Hawaiian *Hamineas* convinces me that this form differs specifically from *H. curta* A. Ad.

The three species preceding, as well as *H. papyrus* (A. Ad.), *H. brevis* (Q. & G.), *H. cairnsiana* Melv. and *H. cuticulifera* Smith, belong to the group which I have called *Liloea*. It is quite possible that when the animal can be examined, this group will be transferred to the vicinity of *Atys*. The sculpture and the form of the columella are much like *Atys* and unlike other groups of *Haminea*. *Atys*, however, has a fold in the axis posteriorly. *Roxaniella* Monts and *Damoniella* Iredale<sup>5</sup> differ by having the summit umbilicate. It is barely perforate or sometimes imperforate in *Liloea*.

***Volvatella fragilis* Pease.**

*Volvatella fragilis* Pse., P. Z. S. 1860, p. 20; Amer. Journ. Conch. IV, p. 73, pl. 7, fig. 4. Description and figures repeated in Man. Conch. XV, p. 384.

Sandwich Islands. Not found since the time of Pease.

**HYDATINIDÆ.**

Thin, oval, capacious shells, banded, with the spire flattened or convex. The Hawaiian species are widely ranging forms.

1. Base contracted by a furrow running spirally from the insertion of the columella; aperture shorter than the shell; two pink and three white zones, separated by narrow blackish bands.

*Hydatina (Aplustrum) amplustre* (L.).

Base not so contracted; aperture nearly as long as the shell; columella broadly concave.....2

<sup>5</sup> *Damoniella* Iredale, Proc. Malac. Soc. Lond. XIII, p. 37, new name for *Roxania* Leach, not *Roxana* Stephens. Type *Bulla cranchii*.

2. Large, with many brown spiral lines; columellar reflection lunate, not appressed; spire level, of  $3\frac{1}{2}$  whorls parted by a deep suture; length 26, diameter 18 mm.

*Hydatina physis staminea* (Mke.)

Small, with two or three remote spiral lines and spaced, festooned axial lines of brown; spire minute, of  $2\frac{1}{2}$  whorls; columellar reflection closely appressed; length 9, diameter 6 mm., often smaller.....*Micromelo guamensis* (Q. & G.)

***Hydatina physis staminea* (Mke.)**

Honolulu Harbor, Oahu; Kainalu, Molokai (Wm. A. Bryan).

All of the Hawaiian specimens seen belong to this subspecies. The typical *H. physis* is larger and more globose.

***Hydatina (Aplustrum) amplustre* (L.)**

Honolulu Harbor and Kahana, Oahu; Kailua, Hawaii (W. A. Bryan). Kahoolawe (Pilsbry).

Easily recognized by the pink and white zones bordered with wide blackish lines. One from Kahoolawe measures, length 21, diameter 15 mm.

***Micromelo guamensis* (Quoy & Gaimard). Figure 9.**

Hawaii: Kailua (Wm. A. Bryan). Hilo (Garrett, for *Bulla scripta*).

This snail appears to have been collected rarely, though described long ago. Besides the peculiarities of shape and color-pattern shown in the figure it has spaced spiral series of oblong punctures, *Acteon* like, not easily seen without a lens. The narrow spire is level. The specimen figured measures: length 9, diameter 6 mm. Others are smaller.

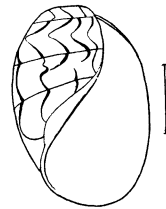


Fig. 9.—*Micromelo guamensis*.

**AGLAJIDÆ.**

*Aglaja*, better known as *Doridium*, appears to be well represented in the islands, though so far as I know, each species has been taken but once. Two were described by Pease under the genus *Philineopsis*, which appears to be the same as *Aglaja*.

The small shell is entirely concealed in the mantle.

***Aglaja speciosa* (Pease)**

Above fawn, spotted and speckled with white, margins varied with blackish and yellow; sides paler; foot purplish fawn closely freckled with whitish. 3 inches long.

Seen only by Pease, whose full description of this species and *A. nigra* may be found in Manual of Conchology, vol. XVI. He gave only "Sandwich Islands" as locality.

***Aglaja nuttalli* Pils.**

Uniform black-brown above, pale with faint lighter maculation below. A caudal filament. Length 40 mm.

Sandwich Islands (Nuttall). Based on an old alcoholic specimen. Man. Conch. XVI, p. 50.

***Aglaja nigra* (Pease)**

Black, two large white spots on anterior end, two on head disc, and two on mantle lobes; sides white. Foot white, with three large black spots on each revolute side. Unknown to recent collectors.

***Aglaja pilsbryi hawaiiensis* n. subsp. Figure 10.**

Similar to *A. pilsbryi* Eliot,<sup>6</sup> of the Samoan Islands, in having figure 8 shaped black marks on both cephalic shield and mantle, but the figures are heavier than in that species. The markings on the parapodia are reduced to a few black spots along the lateral borders, four on each side, one being beneath; and there is an imperfect black rim on the front edge of foot. The ground color is brownish (perhaps stained by the alcohol, which has a yellowish tint). No posterior filament.



Fig. 10.—*Aglaja pilsbryi hawaiiensis*.

Length about 24 mm.

Hilo, Hawaii (D. Thaanum). Type 47421 A. N. S. P.

This is probably related to *A. nigra* (Pse.), and may possibly be a less pigmented form or race of that, though I do not think so. As Pease's species has not been figured, no close comparison can be made.

## XV. VARIOUS GASTROPODS AND PELECYPODS.

### MURICIDÆ.

***Vexilla thaanumi* n. sp.**

Hilo, Hawaii. Types no. 127747 A. N. S. P., collected by D. Thaanum.

The shell is obovate, widest at the upper third, very solid. Surface dull, regularly sculptured with very low, rounded, cantiguous

<sup>6</sup> *Doridium* (*Aglaja*) *pilsbryi*, Eliot. Proc. A. N. S. Phila., 1899, p. 512, pl. 19, figs. 1a, 1b. Reef at Apia, Samoan Is. The type specimen is No. 47422, A. N. S. P.

spiral girdles parted by impressed lines, and themselves weakly striate spirally; deep brownish drab, every third or fourth girdle yellowish, or in worn shells whitish; there being 8 or 10 of these pale, narrow bands. The spire is extremely short and obtuse. The aperture is oblique, of about equal width almost throughout, blackish brown deep in the throat, becoming pale or white within the lip. The outer lip is very thick, bevelled, liver-brown, its outer edge minutely scalloped, the inner edge set with 10 or 12 small teeth. The columellar border is broadly flattened, vinaceous-brown with pale inner edge.

Length 14, diameter 9.5 mm.; length of aperture 12.3 mm.

Length 13.6, diameter 9.6 mm.

The operculum is liver-brown, long and narrow, widest above, the nucleus (which is worn away) at the upper, outer extremity; the outer margin arcuate, inner margin straight.

It is near *V. taeniata* Powys, but smaller and wider in the upper part.

***Murex cyclostoma baldwiniana* n. subsp.**

The shell is similar to *M. cyclostoma* Sowb. in having the faces of the varices cellular, in the shortly oval aperture and sculpture of strong encircling cords; but the specimens from two sources are very much smaller. There are 5 cords on the last, 2 on the penult whorl. The nearly closed anterior canal is a little shorter than the aperture.

Length 8.2, diameter 5.2 mm.

Kailua, Kona coast of Hawaii (Bryan); Maui (D. D. Baldwin).

Possibly distinct from *M. cyclostoma*, which is a much larger shell; a longer series is needed to show whether the small size is constant.

#### VANIKORO.

The following species of *Vanikoro* are now known from the Islands. For references see Smith, Proc. Malac. Soc. London, VIII, 104-117.

*Vanikoro semiplicata* Pease. Hilo, Hawaii; Paumalu, Oahu; Haena, Kauai.

*Vanikoro imbricata* Pease. Hilo, Hawaii; Kaneohe Bay, Oahu.

*Vanikoro acuta* (Recl.). Kaneohe Bay, Oahu; Haena, Kauai. Originally described from Lord Hood's Island, on coral reefs. The Hawaiian specimens appear to be quite typical.

***Vanikoro hawaiiensis* n. sp.**

The shell is openly umbilicate, subglobose, with small, conic, acute spire; white with the apex brown. Embryonic and nepionic 3

whorls brown, high conic, the first smooth, the others having 3 spiral cords. The next two whorls have very strong retractive ribs nearly as wide as their intervals, crossed by spiral cords which bead the ribs. On the first post-nepionic whorl I count 13 ribs; on the second there are about 9 cords, and the ribs become very low, fading out, on its last third. The last  $1\frac{1}{2}$  whorls have a close sculpture of slightly unequal spiral threads; lines of growth are scarcely visible. The umbilicus is funnel-shaped, rather weakly axially plicate within, its margin smooth and rounded. The aperture is oblique, semi-circular, the inner border slightly concave.

Length 5.5, diameter 5.4 mm.,  $3\frac{1}{2}$  post-nepionic whorls.

Hilo, Hawaii; Kaneohe Bay, Oahu; Haena, Kauai.

Type 116963 A. N. S. P.

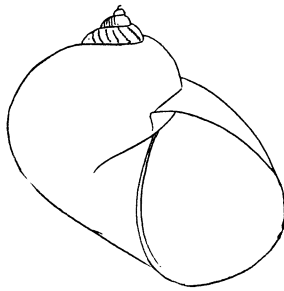


Fig. 10—*Vanikoro hawaiiensis*.

***Vanikoro kanakarum* n. sp.**

Shell openly umbilicate, subglobose, with a short, conic spire and slightly obtuse apex; white, the apex brown. The embryonic and nepionic shell is semiglobose, of little more than one whorl, and smooth. Retractive ribs then set in, continuing for two whorls; their intervals are a little wider than the ribs, and crossed by about 10 spiral cords. The adult sculpture abruptly replaces this ribbed neanic stage. It consists of spiral threads, between which there are one to three finer threads. Lines of growth are scarcely noticeable. The umbilicus is funnel-shaped, slightly plicate inside, bounded by a nearly smooth rib, but slightly prominent. The aperture is semi-circular.

Length 3.7, diameter 4 mm.;  $3\frac{1}{4}$  post-nepionic whorls.

Haena, Kauai.

The shape of the shell, in the floating stage, differs entirely from that of *V. hawaiiensis*. The ribbed neanic stage is longer. The type



would probably add another whorl; I think it is possibly not full-grown; but I cannot identify it with any of the species hitherto described.

#### CÆCIDÆ.

In the Challenger Report, de Folin records *C. sepimentum* de Fol., *C. crystallinum* de Fol., and *Strebloceras subannulatum* de Fol. from Honolulu. Subsequently he added *Meioceras sandwichensis* de Fol.

*C. sepimentum* has been taken at Hilo, Hawaii, by Thaanum, abundantly at Mokapu Point, Oahu, by Bryan, and at Moomomi, Molokai by myself. *S. subannulatum* also occurs at Mokapu Point.

##### **Cæcum oahuense** n. sp.

The shell is similar to *C. sepimentum* in form. It has an evenly convex septum. The aperture is moderately contracted. Sculpture of 40 rounded rings, hardly as wide as their intervals, and much smaller than those of *C. sepimentum*.

Length 2.2, diameter at septum 0.38, at aperture 0.5 mm.

Mokapu Point, Oahu.

##### **Fossarus ecphora** n. sp.

The shell is umbilicate, white with a dark brown embryonic whorl. Sculpture of three very prominent spiral ridges and one or two minor ones on the last whorl, the upper one appearing on earlier whorls, the rest of the surface having fine spiral threads and axial striae. Spire shorter and ridges stronger than in *F. lamellosus* Montr.

Altitude 2.3, diameter 2.5 mm.

Haleiwa, Oahu, Pilsbry, 1913.

This is evidently not the young of *F. garrettii* Pse., which has been taken at Hilo, Hawaii and Koko Head, Oahu.

*F. multicostata* Pse., has been found at Waikiki and Kaneohe Bay, Oahu.

##### **Epitonium decussatum** (Pease).

Not an uncommon species. Dr. Dall informs me that the name is pre-occupied.

##### **Epitonium kanemoe** n. sp. Fig. 11 b.

It is very slender, imperforate, white, with sculpture of slender, recurved ribs, 8 on the last whorl, the intervals having minute axial striae and coarser, more spaced spiral threads. Whorls not quite in contact except at the ribs.

Length 10.4, diameter 3.3 mm.; 10 whorls, the tip lost.

Haena, Kauai.

It is as narrow as *E. umbilicatum* (Pse.), but has fewer ribs and the spirals would not be called "remote." It is more slender than *E. decussatum*, with more delicate ribs.

***Epitonium fucatum* (Pse.) Fig. 11 a.**

It is broader, than *Epitonium decussatum*, clouded with brown in the peripheral region, with rather strong ribs, 10 on the last whorl. Interstitial sculpture and form of the whorls about as in *decussatum*.

Honolulu Harbor.

Length 14.5, diameter 5.8 mm.; 7 whorls remaining, the apex lost.

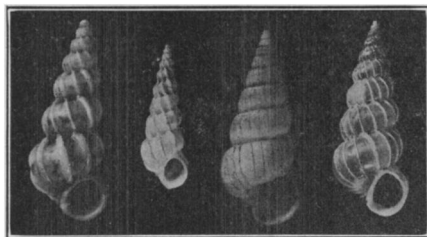


Fig. 11.—a, *Epitonium fucatum* b, *E. kanemoe*. c, *E. ulu*. f, *E. oahuense*.

Dr. Dall suggests that this may be the unfigured *Scalaria fucata* Pse.

***Epitonium ulu* n. sp. Fig. 11c.**

Related to *S. crispata* Pse., of the Paumotu group, but having the delicate riblets much more widely spaced. There are about 21 of these thread-like riblets on the last whorl. The base is perforate; columellar lip reflected below. Aperture rather trapezoidal, the parietal callus thin, outer lip narrowly reflected. White.

Length 14, diameter 5.8 mm.; 10 whorls, the tip lost.

Hilo, Hawaii. D. Thaanum.

***Epitonium oahuense* n. sp. Fig. 11d.**

Resembling *E. turricula* (Sowb.). The shell is umbilicate, rather thin, suffused and clouded with brown. Glossy, having thin riblets with a few wider ones, 14 on the last whorl; in the intervals minute, unequal engraved spiral lines may be seen. The whorls are in contact, well rounded. The aperture is shortly ovate, peristome adnate for a short distance above.

Length 14, diameter 5.3 mm.; aperture 3.5 mm. long; 9 whorls, the tip lost.

Oahu: Honolulu Harbor and Kahana.

*Epitonium perplexum* (Pse.) is the largest Hawaiian species known to me, also the most generally distributed. *E. alatum* (Sowb.), *E. millecostatum* (Pse.) and *E. decussatum* (Pse.) have been taken by Prof. Bryan and Mr. Thaanum. *E. attenuatum* and *umbilicatum* of Pease I have not seen. I have provisionally identified a small specimen from Waimanalo, Oahu, as *E. paumotense* (Pse.). The curious, solute *E. hyalinum* (Sowb.) is represented in Kaneohe Bay by specimens agreeing well with those from Luzon in shape, but of smaller size, the largest 8 mm. long, 4 wide, of five whorls after the slender nepionic tip; 8 ribs on the last whorl, 7 points on each rib. This small race may be called *E. hyalinum mokuoloense*.

**Haplocochlias** (**Lophocochlias**) **minutissimus** n. sp.

The very small shell is umbilicate, turbinate, not nacreous, white with a conic brownish spire. The first whorl appears to be smooth; on the second fine radial folds or puckering appears below the suture, becoming coarser on the following whorl. The last whorl has six strong, smooth spiral keels, narrower than the intervals, which are flat and crossed by numerous retractorily axial threads, which are much narrower than their intervals. Within the umbilicus two rather small spiral cords are seen. The aperture is quite oblique, subcircular. The outer lip is strengthened by a rounded external rib or varix a short distance behind the edge.

Length 1, diameter 0.9 mm.;  $4\frac{1}{3}$  whorls.

Mokapu Point, Oahu, 4 specimens.

By the well-developed varix this shell resembles *Haplocochlias* or *Liotia*. I have placed it in the former genus with doubt. It differs by the very strong sculpture and the open though not wide umbilicus, which may characterize a separate section *Lophocochlias*.

This is the smallest Hawaiian sea shell I have seen.

#### LEPTOTHYRA.<sup>7</sup>

The following species have been reported from the Hawaiian Islands.

*L. verruca* Gld.

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<sup>7</sup>Perhaps this name should yield place to *Anadema* A. Ad., but the type of that group is imperfectly known. It is larger than the known Leptothyrae. See Man. of Conch. X, p. 255.

*L. rubricincta* Migh.

*L. candida* Pse.

*L. (?) marmorea* 'Pse' Sowb.

*L. costata* Pse.

Only the first two can be considered well known.

*Leptothyra verruca manti*, n. subsp., differs from the typical form by the black (on the beach fading to brown or olive-brown) color of the tessellation, or it may be black with whitish spots, and the smaller size, altitude 4, diameter 3.8 mm. It is from Diamond Head, Oahu, Haena, Kauai and other places, often abundant.

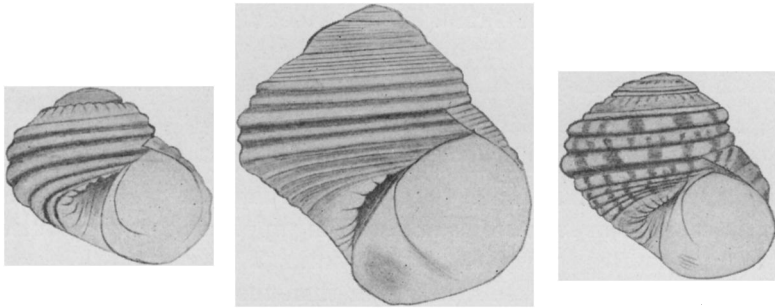


Fig. 12.—*Leptothyra candida*  
*percostata*.

Fig. 13.—*L. viaria*.

Fig. 14.—*L. balnearii*.

*Leptothyra candida percostata* (fig. 12) is a small, thick, white, narrowly umbilicate shell, with sculpture of 7 spiral ribs, the first radially plicate, the rest smooth, below them a broad, radially plicate border about the umbilicus. The aperture is rounded, oblique. Columella arcuate, narrow next to the umbilicus, very broad and flat at the base. Length 2.3, diameter 2.5 mm. It differs from *L. candida* as defined by Pease by the solidity and coarse ribs. Has been taken at Haleiwa and Honolulu (Pilsbry) and Hilo (Thaanum).

There are sometimes interstitial threads between the ribs.

***Leptothyra balnearii* n. sp. Fig. 14**

The shell is perforate, solid and thick, red tessellated with white (or entirely red), the first whorl white. Sculpture of smooth spiral cords, of which four in the flattened peripheral region are large; above them there is a small cord and a flattened, radially plicate sub-sutural band; below there are four small cords and a strongly plicate band around the umbilicus. Aperture oblique. Columella

straightened outwardly, concave within, dilated and very broad towards the base. Outer lip thin-edged.

Altitude 2.6, diameter 2.6 mm.

Off Waikiki, 25–50 fms. D. B. Langford. This species agrees partly with Pease's *L. costata* (Maui), but that is said to be "mottled and spotted with white, black and brown." It is also larger.

**Leptothyra viaria** n. sp. Fig. 13.

The shell is solid, narrowly umbilicate, buff-white with small scattered olivaceous dots. Sculpture of about 5 smooth larger cords in the peripheral region, about 4 smaller ones on the base, the intervals of all finely striate spirally; above the peripheral cords there are subequal spiral threads, 7 in the type specimen; the penult whorl is angulated in the middle. Umbilicus is surrounded by a rounded, radially plicate ridge. The columella is narrow above, very much produced basally, with a broad, excavated face. Outer lip thin.

Altitude 3.7, diameter 3.5 mm.

Honolulu, type locality, and Haleiwa, Pilsbry.

Apparently related to *L. costata* Pse., but differing in proportions and various other details from that still unfigured species.

**Siphonaria normalis** Gld.

Specimens from numerous places on all of the islands except Lanai and Niihau examined, often in large series. There are many local forms, but so far as I can see, but one species, *S. normalis* Gld., which varies extraordinarily in size, color and sculpture. The following names are on the Hawaiian list.

*S. normalis* Gld. Proc. Bost. Soc. N. H. II, 1846, p. 178; Otia Conch. pp. 12, 242; U. S. Expl. Exped., Mollusca, p. 359, pl. 30, fig. 468.

The type was a small, dark subregular form, 10 mm. long.

*S. amara* Nuttall, Reeve, Conch Icon., IX, 1856, pl. 7, fig. 33 ("California").

Said by Reeve to be from California, but this was a mistake. A set given by Nuttall is labelled "Atooi" (=Kauai). Carpenter has noted this in his Mollusca of Western North America.

*S. funiculata* Reeve, Conch. Icon. IX, pl. 7, fig. 35 (Hab. unknown). Name changed to *S. lirata* on index page, as *funiculata* had been used for another species.

This is the very black form.

*S. nuttalli* Hanley, Proc. Zool. Soc. Lond., 1858, p. 152 (Ins. Sandwich).

*S. crebricostata* Nuttall Ms. was placed by Reeve in the synonymy of *S. sipho* Sowb., but it was really a Hawaiian shell, a rather large form of *S. normalis*.

The specimens of a colony are usually rather uniform. The finest seen are from Lahaina, length 21, height 9 mm. In Honaunau Bay, Hawaii, all seen are small, about length 10, altitude 4.5 mm., and they are very black (var. *lirata* Rve.). Further up the coast the shells are larger, often with some ribs emphasized. At Moomomi, Molokai, the cavity is some shade of chestnut, border wide, whitish with many brown rays. Similar shells occur at Honokowai, Maui, Diamond Head, etc. These shells agree best with var. *amara*.

On the north shore of Kahoolawe I found some very flat shells with 4 or 5 posterior ribs very emphatic (fig. 15). This may be called *S. normalis* form *chirura*. Length 10.5, alt. 2.5 mm.

All of these forms have the same dark, oblong, *Nacella*-like embryonic shell, with posterior apex, and all seem to fade into one another in color and sculpture, in the series of some hundreds examined.

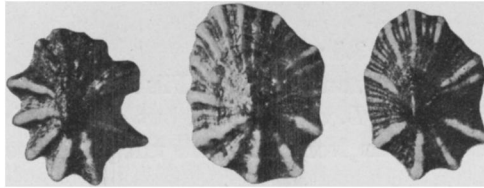


Fig. 15.—*Siphonaria normalis* form *chirura*.

***Stomatella concinna inconcinna* n. subsp.**

Similar to *S. concinna* in shape, but dull, greenish white, with some opaque white flames and sometimes a few small brownish dots on the base; these markings confined to the spiral cords. Spiral cords more or less distinctly alternating in size.

Greatest dimension 3.5 mm.

Honolulu, on the reef, Pilsbry, 1913. 3 specimens.

***Heteroglypta kanaka* n. sp. Fig. 16.**

The shell is oblong, compressed, white, faintly freckled with tawny. The small beaks are central. Anterior part tapering, rounded at the end. Posterior part wider, obliquely truncate. Sculpture of rounded ribs posteriorly, divaricating from a line from the beaks to the lower posterior angle, curved and running to the posterior end behind, straight and running to the basal margin in front of the line of divarication. The rest of the surface has narrow impressed lines running obliquely backward and downward except close to the anterior end, where there is some very weak oblique corrugation,

running to the upper anterior margin. The pallial sinus is deep, extending past the beaks. The right valve has two diverging cardinal teeth, and a pink spot on the hinge margin on each side of the cardinal region.

Length 11.4, altitude 6.3, diameter 3 mm.

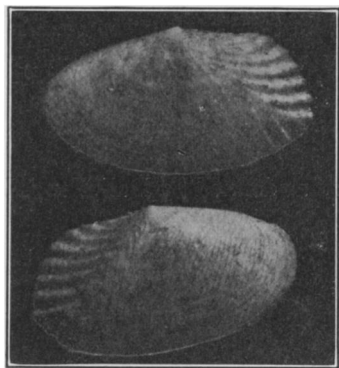


Fig. 16.—*Heteroglypta kanaka* n. sp.

Off Waikiki, near Honolulu, 35–50 fms. D. B. Langford.

While it differs from *H. contrarius* Dh. in proportions of the shell and arrangement of the sculpture-areas, I have not found any more closely related species.

**Loripes (Pillucina) spaldingi** n. sp. Fig. 17.

The shell is rather strong, rounded-oval, higher than long, very plump; white with some unevenly spaced grayish streaks along darker lines of growth-arrest. Sculpture of rather irregular but close concentric wrinkles and radial lines, which are distinct at the ends but nearly obsolete in the median part. Beaks rather prominent, median. Anterior end evenly rounded; posterior end less produced and less convex; basal margin strongly convex. Lunule small, rather deeply impressed, wider and deeper in the right valve. The internal margin is finely crenulate. Cavity of the beaks narrow and deep. There is a stout median cardinal tooth in the right valve, a prominent,

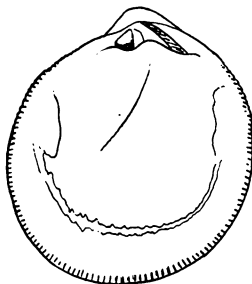


Fig. 17.—*Loripes spaldingi*, n. sp.

erect, triangular anterior cardinal in the left. No laterals. Anterior adductor scar elongate (shown too short in the figure).

Length 7.4, altitude 8.5, diameter 6.5 mm.

Oahu: Kaneohe Bay, Spalding, Thurston and Pilsbry, type locality; Paumalu, W. A. Bryan.

This little clam is related to the Japanese *Lucina parvula* Gld. (*L. pisidium* Dkr.), but it is plumper and higher. Lateral teeth seem to be entirely wanting. These species appear to represent a new subgenus of *Loripes*, *Pillucina*; *L. spaldingi* being the type. Shell plump, with radial sculpture, the anterior adductor scar less elongate.

*Loripes* is here used as defined by Dall, Proc. U. S. N. Mus. XXIII, p. 803.